

SUMMARY

2010-11

SUMMARY

1.0 General

This review covers the performance of Hydro-Electric Stations having installed capacity of more than 25 MW. As on 31st March, 2011 there were 609 H.E. generating units installed in 174 Hydro-Electric Stations with an aggregate installed capacity of 37567.40 MW in operation. Performance of 31 important Reservoir based schemes has also been discussed separately in Chapter-3.

This review also covers programme for renovation & modernization and uprating of HE Stations in the country. Information in respect of renovation & modernization, uprating and life extension of HE stations in the country (as on 31.03.2011), programme for the year of 2010-11, achievements during the year 2010-11 and programme for the year 2011-12 have been given in Chapter-8.

Region wise summary of the existing HE Stations in operation with installed capacity above 25 MW as on 31.3.2011 in the country vis-à-vis that on 31.3.2010 is given below in Table (S-I).

TABLE S-1

REGIONWISE SUMMARY OF HYDRO-ELECTRIC STATIONS
(2010-11 VIS-A-VIS 2009-10)

Region	No of Stations as on		No of Units as on		Capacity (MW) as on	
	31.03.11	31.03.10	31.03.11	31.03.10	31.03.11	31.03.10
Northern	55	52	189	182	13878.25	13366.25
Western	29	29	101	101	7392.00	7392.00
Southern	65	64	238	234	11333.45	11141.45
Eastern	16	16	55	55	3847.70	3847.70
N-Eastern	9	9	26	26	1116.00	1116.00
All India	174	170	609	598	37567.40	36863.40

2.0 Generation Performance

The generation from the hydro electric power Stations in the country during 2010-11 was 114257.36 MU (excluding import from Bhutan) which was 2.61% more than target of 111352 MU.

2.1 Utility wise Performance of H.E. Stations

The utility wise target of energy generation vis-à-vis actual Generation and surplus /shortfall in respect of Hydro Electric stations are given in Table S-2.

TABLE S-2

**UTILITY WISE PERFORMANCE OF HYDRO ELECTRIC POWER STATIONS
(2010-11 VIS-A-VIS 2009-10)**

(Energy Generation (MU))

Utilities	Target		Actual		Surplus (+)/ Shortfall (-) in %	
	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10
CENTRAL SECTOR						
BBMB	9275	10500	11273.43	9371.32	21.55	-10.75
NHPC	16668	16675	18603.45	16980.47	11.61	1.83
SJVNL	6500	6400	7140.09	7018.86	9.85	9.67
THDC	2897	2850	3116.03	2116.78	7.56	-25.73
NHDC	3200	3488	3197.72	3071.23	-0.07	-11.95
DVC	315	325	115.00	188.35	-63.49	-42.05
NEEPCO	2787	3001	2603.19	2150.49	-6.60	-28.34
SUB TOTAL	41642	43239	46048.91	40897.50	10.58	-5.42
PRIVATE SECTOR						
JHPL	1213	1213	1474.00	1303.46	21.52	7.46
JPVL	1775	1775	2022.72	1977.35	13.96	11.40
MPCL	340	350	333.64	301.76	-1.87	-13.78
TATA HYDRO	1450	1450	1310.32	1455.03	-9.63	0.35
DLHP	58	58	56.71	54.62	-2.22	-5.83
EPC	150	70	-	-	-	-
ADPL	614	150	144	-	-76.53	-
LGPPPL	120	40	-	-	-	-
SUB TOTAL	5720	5106	5341.49	5092.22	-6.62	-0.27
STATE SECTOR						
J&KPDC	3136	3346	3552.20	3312.45	13.27	-1.00
HPSEB LTD.	1615	1612	1738.59	1526.25	7.65	-5.32
RRVUNL	725	898	390.14	346.31	-46.19	-61.44
PSPCL	3415	3752	4190.82	3162.58	22.72	-15.71
UPJVNL	1272	1380	700.00	913.60	-44.97	-33.80
UJVNL	4621	4570	4750.91	3953.56	2.81	-13.49
SSNNL	2403	3483	3588.78	2501.36	49.35	-28.18
GSECL	676	979	575.53	438.27	-14.86	-55.23
MAHAGENCO	3609	3848	4461.21	3796.09	23.61	-1.35
MPPGCL	2487	2500	1700.25	1729.80	-31.63	-30.81
CSPGC	310	310	125.21	255.05	-59.61	-17.73

APGENCO	8175	9012	8009.58	5821.14	-2.02	-35.41
KPCL	11867	11843	10746.89	12248.49	-9.44	3.42
KSEB	6905	6769	6801.62	6415.71	-1.50	-5.22
TANGENCO	4935	4700	4957.52	5511.03	0.46	17.26
JSEB	152	152	3.46	115.68	-97.72	-23.89
OHPC	5679	6041	4754.25	3920.01	-16.28	-35.11
WBSIEDCL	998	948	1129.99	1077.47	13.23	13.66
APGCL	415	450	406.78	400.37	-1.98	-11.03
MeECL	595	530	283.23	481.33	-52.40	-9.18
SUB TOTAL	63990	67123	62866.96	57926.55	-1.76	-13.70
ALL INDIA	111352	115468	114257.36	103916.27	2.61	-10.00

It is observed that during the year 2010-11, overall hydro generation was more than the target in respect of stations of BBMB, NHPC, SJVN and THDC in Central Sector and JHPL & JPVL in Private Sector. As regarding generation by State Electricity Boards/Corporations /Departments, hydro generation was more than the target in respect of stations of J&KPDC, HPSEB Ltd., PSPCL, UJVNL, SSNNL, MAHAGENCO, TANGENCO and WBSIEDCL.

2.2 Sector wise Performance of H.E. Stations

Sector wise generation performance of H.E.Stations during 2010-11 is given in Table S-3. It would be seen that there was short fall in generation as compared to target in all Sector.

TABLE S-3

SECTOR WISE PERFORMANCE OF HYDRO ELECTRIC POWER STATIONS (2010-11 VIS-A-VIS 2009-10)

Sector/Board/ Corporation	Energy Generation (MU)					
	Target		Actual		Surplus(+)/Deficit(-)	
	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10
Central	41642	43239	46048.91	40897.50	(+)10.58	(-) 5.42
State	63990	67123	62866.96	57926.55	(-)1.76	(-) 13.70
Private	5720	5106	5341.49	5092.22	(-)6.62	(-) 0.27
Total	111352	115468	114257.36	103916.27	(+)2.61	(-) 10.00

3. Outage Analysis

Outage data of 174 H.E. Stations covering 609 units and having an aggregate installed capacity of 37567.40 MW was made available by various utilities for the purpose of this Review. For outage data analysis during 2010-11, hydro stations above 25 MW installed capacity have been considered. Region wise details of these 174 hydro power stations are given below (Table S-4).

TABLE S-4

**REGIONWISE SUMMARY OF HE STATIONS ANALYSED
(2010-11 VIS-A-VIS 2009-10)**

Region	No of Stations		No of Units		Capacity(MW)	
	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10
Northern	55	49	189	173	13878.25	12706.25
Western	29	29	101	101	7392.00	7392.00
Southern	65	64	238	234	11333.45	11141.45
Eastern	16	16	55	55	3847.70	3847.70
North Eastern	9	9	26	26	1116.00	1116.00
All India	174	167	609	589	37567.40	36203.40

3.1 Planned Maintenance

The number of H.E.Stations falling under various ranges of non-availability due to planned maintenance during the year 2010-11 is summarized below (Table S-5)

**TABLE S-5
NON-AVAILABILITY OF HE STATIONS DUE TO PLANNED OUTAGES
(2010-11 VIS-A-VIS 2009-10)**

% Non availability due to planned maintenance	2010-11		2009-10	
	Nos of Stations	Capacity (MW)	Nos of Stations	Capacity (MW)
0	19	3067.20	18	3130.75
Up to 5	75	17671.95	62	15770.30
>5 to 10	40	7250.45	49	11166.30
>10 to 15	21	5101.00	22	3997.85
>15 to 20	12	2480.00	5	486.00
>20 to 25	2	570.60	4	666.00
>25 to 30	0	0.00	4	620.00
above 30	5	1426.20	3	366.20
Total	174	37567.40	167	36203.40

It could be seen from above that no planned maintenance was carried out at 19 hydro electric stations during 2010-11 as compared to 18 hydro stations during 2009-10.

Non-availability due to planned maintenance was more than 30% at 5 H.E. Stations during 2010-11. Details of which are given at Table S-6.

TABLE S-6
H.E. STATIONS HAVING HIGH PLANNED MAINTENANCE
FOR THE PERIOD: (2010-11)

Sl. No	Name of Station	Capacity(MW)	P.M.N.A*(%)
1	Bassi	60.00	38.56
2	Rihand	300.00	41.42
3	Koyna-IV	1000.00	43.70
4	Bhadra	39.20	55.55
5	Jaldhaka St-I	27.00	80.91

- **P.M.N.A** -Non availability due to Planned Maintenance

The duration of various types of periodic planned maintenance varied considerably from station to station. Details of average time taken for various types of maintenance are given in Table S-7.

TABLE S-7
AVERAGE DURATION OF VARIOUS TYPES OF PLANNED MAINTENANCE
PERIOD: (2010-11)

Sl. No	Type of Planned maintenance	Average duration at any unit (Hrs)
1	Capital	690.44
2	Annual	554.95
3	Half Yearly	0.00
4	Quarterly	37.83
5	Monthly	76.03
6	Routine	96.12
7	Renovation & Modernisation	1262.73
8	Up rating	253.78
9	Civil Structure	117.30
10	Turbine	115.93
11	Generator	235.88
12	Other Equipments	32.32
13	Miscellaneous	183.12

It has been observed that there were wide variations in the time taken at different hydro units for the same type of periodic maintenance. The reasons for this can be attributed to following factors.

- The nature and the extent of work involved may vary from unit to unit.
- Availability of spare parts could be a constraint at some units.
- The working of the agency entrusted with the maintenance work could be different.
- Administrative and procedural difficulties may be faced at some of the stations.

Summary of planned maintenance carried out on various equipments like generators, turbine and other equipments during 2010-11 vis-à-Vis 2009-10 is given below (Table S-8)

TABLE S-8

**DURATION OF PLANNED MAINTENANCE FOR GENERATOR,
TURBINE & OTHER EQUIPMENTS
(2010-11 vis-à-vis 2009-10)**

Sl.No	Equipments	Duration			
		Maximum Hours for any unit		Average Hours	
		2010-11	2009-10	2010-11	2009-10
1	Generator	8736.00	3119.93	235.88	191.25
2	Turbine	3504.00	1244.83	115.93	82.82
3	Other Equipment	305.28	2251.70	32.32	79.71
4	Civil Structure	2183.95	1564.30	117.30	110.98

It could be seen that the average hours utilized for carrying out various repairs was more for generator and turbine during 2010-11 as compared to 2009-10.

3.2 Forced Outages

The summary of forced outages caused due to break-down of generator, turbine and other equipments during 2010-11 vis-à-Vis 2009-10 is given below (Table S-9)

TABLE S-9

**FORCED OUTAGES DUE TO GENERATOR, TURBINE & OTHER EQUIP. FAULTS
2010-11 VIS-A-VIS 2009-10)**

Sl. No.	Equipment	Forced Outage (Hours)		% of total Forced Outage	
		2010-11	2009-10	2010-11	2009-10
1	Generator	65967.76	71662.24	19.41	20.92
2	Turbine	61150.94	54797.15	17.99	16.00
3	Other Equipments	50343.25	39813.99	14.81	11.62
4	Civil Structure	23408.59	15328.22	6.89	4.47
5	Others	139016.04	160960.02	40.90	46.99
	Total	339886.59	342561.62	100.00	100.00

Region wise performance in respect of planned maintenance, forced outages and operating availability of H.E. Units for 2010-11 is indicated below (Table S-10).

TABLE S-10

**AVAILABILITY OF UNITS - REGION-WISE
PERIOD: 2010-11**

SL. No.	REGION	NO. OF UNITS	INSTALLED CAPACITY (MW)	PLANNED MAINTENANCE (%)	FORCED OUTAGE (%)	OPERATING AVAILABILITY
1	NORTHERN	189	13878.25	7.49	2.78	89.73
2	WESTERN	101	7392.00	9.38	3.19	87.43
3	SOUTHERN	238	11333.45	6.33	5.24	88.43
4	EASTERN	55	3847.70	5.61	3.64	90.75
5	NORTH EASTERN	26	1116.00	4.38	11.13	84.49
	ALL INDIA	609	37567.40	7.23	3.94	88.83

On analyzing various types of planned shut downs, it may be concluded that:

- Generating units installed in Western Region accounted for Maximum non-availability due to planned maintenance (9.38%) whereas generating units installed North-Eastern Region accounted for the least non-availability due to planned maintenance (4.38%) as indicated in Table S-10.

3.2 General Overview

General overview indicating generation, planned maintenance (PM), forced outage (FO) and operating availability (OP.AV.) of H.E. Stations during the past ten years is given below:

OVERVIEW

YEAR	INSTALLED CAPACITY	GENERATION (MU)		VARIATION	UNITS ANALYSED		PM	FO	OP. AV.	AVER-AGE (PLF)
	(MW)	TARGET	ACTUAL	%	Nos	CAP (MW)	%	%	%	%
2010-11	37567.40	111352	114257	(+)2.61	609	37567.40	7.23	3.94	88.83	34.7
2009-10	36863.40	115468	103916	(-)10.00	589	36203.40	6.19	2.90	90.91	32.2
2008-09	36846.40	114841	109840	(-)4.35	572	35312.45	6.38	2.45	91.17	34.0
2007-08	37002.10	109450	123424	(+)12.80	641	31033.00	5.66	2.34	92.00	38.1
2006-07	34546.10	101000	113359	(+)12.24	684	32016.05	7.03	3.65	89.32	37.4
2005-06	32182.25	91480	101293	(+)10.73	639	30897.30	7.45	3.31	89.24	35.9
2004-05	30446.30	84000	84495	(+)0.59	636	29574.30	7.94	2.21	89.85	31.7
2003-04	29405.15	83050	73775	(-)11.17	598	26846.50	6.94	2.30	90.76	28.6
2002-03	26793.50	82814	63834	(-)22.92	472	21921.40	8.33	2.62	89.05	27.2
2001-02	26131.50	83241	73940	(-)11.20	507	23942.60	7.47	3.21	89.32	32.3
2000-01	25004.25	83907	74481	(-)11.23	406	19667.15	8.23	3.58	88.20	34.0